

CRS Report for Congress

Received through the CRS Web

Research and Development in the Department of Homeland Security

Updated June 20, 2003

Daniel Morgan
Analyst in Science and Technology
Resources, Science, and Industry Division

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE 20 JUN 2003		2. REPORT TYPE N/A		3. DATES COVERED -	
4. TITLE AND SUBTITLE Research and Development in the Department of Homeland Security				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Congressional Research Service The Library of Congress 101 Independence Ave SE Washington, DC 20540-7500				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release, distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT SAR	18. NUMBER OF PAGES 26	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

Research and Development in the Department of Homeland Security

Summary

The Department of Homeland Security incorporates a number of research and development activities that were transferred from other agencies when the department was established by the Homeland Security Act of 2002 (P.L. 107-296). It also includes a number of new activities. The Department of Homeland Security has requested a budget of approximately \$1 billion for research and development in FY2004, of which approximately \$800 million would fund the Science and Technology Directorate, with the remainder divided among R&D programs in various other parts of the department, such as the Transportation Security Administration and the Coast Guard. (Despite this substantial funding, the department is by no means the only federal agency that conducts homeland security-related R&D.)

This report describes the research and development programs of the Department of Homeland Security and discusses the issues that surround them. These issues include matters specific to individual programs, such as their objectives, budgets, and management and the status of their integration into the new department, as well as general questions, such as the department's model for organizing, funding, and conducting its research and development activities and the challenges it faces for internal and external research and development coordination. Key issues include:

- the content and balance of the proposed R&D portfolio and the transition process for incorporating existing R&D programs that were transferred from other agencies;
- the model for conducting R&D in the department, including the balance between intramural and extramural funding, basic and applied research, and centralized and decentralized organization of program;
- the challenge of internal coordination of R&D programs within the department, including coordination between the Science and Technology Directorate and the R&D programs of other directorates;
- the challenge of external coordination with other agencies, especially the Department of Defense and Department of Health and Human Services, which also conduct major homeland security-related R&D programs;
- the department's relationship with the Department of Energy, at whose national laboratories a significant portion of DHS's R&D will be conducted; and
- the department's relationship with the private sector, which funds and conducts a majority of U.S. R&D and will be responsible for manufacturing most of the technologies developed by DHS, but whose connections with the department are not yet established.

This report will be updated as developments occur.

Contents

Introduction	1
Programs and Program-Specific Issues	1
R&D in the Directorate of Science and Technology	2
Biological Countermeasures	2
Radiological and Nuclear Countermeasures	6
Threat and Vulnerability Testing and Assessments	7
Chemical and High Explosives Countermeasures	8
University Programs, Emerging Threats, and Rapid Prototyping	8
Conventional Missions Program	9
Standards Program	9
Homeland Security Advanced Research Projects Agency	9
Administrative and Advisory Structures	10
R&D Programs in Other Directorates	10
Transportation Security Administration R&D	10
Coast Guard R&D	11
National Infrastructure Simulation and Analysis Center	11
R&D in Other Transferred Agencies	12
Related R&D Programs in Other Departments	12
Crosscutting Issues	14
Models for Conducting and Funding R&D	14
Intramural versus Extramural	15
Basic versus Applied	17
Centralized versus Decentralized	17
Impact of Program Transfers	18
Internal Coordination and Management	19
Coordination with Other Agencies	19
Special Coordination Responsibilities of the Under Secretary	19
Relationship with the Department of Health and Human Services ...	20
Relationship with the National Laboratories	21
Relationship with the Private Sector	22
Congressional Oversight and Appropriations	23

Research and Development in the Department of Homeland Security

Introduction

The Homeland Security Act of 2002 (P.L. 107-296), which established the Department of Homeland Security (DHS), provided for it to include certain research and development activities. Research and development can contribute to many aspects of homeland security, including tasks such as detection of potential threats, protection of people and infrastructure, and effective response following an incident. For example, even before the terrorist attacks in 2001, researchers were developing explosives-detection equipment for airports, improving vaccines against potential biological terror agents, and seeking better ways to protect emergency personnel against chemical threats. Although some of these R&D activities take place in the private sector, most of them are conducted or funded by federal agencies. The Department of Homeland Security is responsible for many of these federal R&D programs, although by no means all of them.

This report describes the R&D programs of the Department of Homeland Security and discusses the issues that surround them. These issues include matters specific to individual programs, such as their objectives, budgets, and management and the status of their integration into the new department, as well as general questions, such as the department's model for organizing, funding, and conducting its R&D activities and the challenges it faces for internal and external R&D coordination. One key question is how the department will absorb the disparate R&D activities that are being incorporated into it, both in its Directorate of Science and Technology and in other directorates. Another issue is the department's model for conducting and funding R&D and how this model will provide for interaction with other stakeholders: the private sector, other federal agencies, the Congress, and others.

For an overview of homeland security R&D conducted in other federal agencies, including a more detailed discussion of interagency coordination, see CRS Report RL31576, *Federal Research and Development Organization, Policy, and Funding for Counterterrorism*, by Genevieve J. Knezo. For CRS products with more information on other aspects of the Department of Homeland Security, see the CRS web site under *Current Legislative Issues: Homeland Security*.

Programs and Program-Specific Issues

The Department of Homeland Security includes a Directorate of Science and Technology, headed by an Under Secretary for Science and Technology. Among other duties, the Under Secretary is responsible for "establishing and administering

the primary research and development activities of the Department.”¹ R&D activities are also conducted in other Directorates (and in certain elements of the department, such as the Coast Guard, that are not part of any Directorate) although the Under Secretary for Science and Technology is responsible for “coordinating and integrating all research, development, demonstration, testing, and evaluation activities” throughout the department.² Dr. Charles McQueary, a former president of General Dynamics Advanced Technology Systems, was confirmed as Under Secretary for Science and Technology on March 19, 2003, and sworn in on April 9, 2003.³

The following sections of the report describe the department’s R&D programs, both in the Directorate of Science and Technology and elsewhere, and discuss program-specific issues such as objectives, budgets, management, and current status. **Table 1** summarizes the program elements and their requested FY2004 budgets.

R&D in the Directorate of Science and Technology

The Directorate of Science and Technology groups its R&D activities into seven portfolios: Biological Countermeasures; Radiological and Nuclear Countermeasures; Threat and Vulnerability Testing and Assessments; Chemical and High Explosives Countermeasures; University Programs, Emerging Threats, and Rapid Prototyping; Conventional Missions; and Standards.⁴ The total FY2004 budget request for the directorate is \$803 million.⁵ The descriptions below explain the content of the portfolios and how they align with the previously existing activities transferred to the Directorate from the Department of Energy (DOE), the Department of Agriculture, and the Department of Defense, as well as with new activities.

Biological Countermeasures. The Biological Countermeasures portfolio, with a requested FY2004 budget of \$365 million, accounts for almost half of the Directorate of Science and Technology. It includes four existing activities that were transferred to the Directorate by the Homeland Security Act:

¹ Homeland Security Act of 2002 (P.L. 107-296), Sec. 302.

² Homeland Security Act of 2002 (P.L. 107-296), Sec. 302.

³ A brief biography of Dr. McQueary as available online at [www.dhs.gov/dhspublic/display?theme=11&content=609]. For a more detailed profile, see “Charles E. McQueary, an Aerospace Guy at the Top of Homeland Security Science,” *CQ Homeland Security*, April 11, 2003.

⁴ Different sources use somewhat different groupings. The description used in this report is based on the DHS *Budget in Brief*. DHS management organization does not necessarily correspond directly to the portfolio description.

⁵ *Department of Homeland Security Budget in Brief*, FY2004, pp. 15-16. Online at [www.dhs.gov/interweb/assetlibrary/FY_2004_BUDGET_IN_BRIEF.pdf].

Table 1. R&D Activities in the Department of Homeland Security

Program or Portfolio (FY04 Budget Request)	Elements Transferred from Other Agencies	Elements Created by Homeland Security Act
Biological Countermeasures (\$365m)	DOE Chemical & Biological National Security (part) DOE Life Sciences (microbial pathogens) USDA Plum Island Animal Disease Center	—
Radiological/Nuclear Countermeasures (\$137m)	DOE Proliferation Detection (nuclear smuggling) DOE Nuclear Assessment DOE Environmental Measurements Laboratory	—
Threat and Vulnerability Testing and Assessments (\$90m)	DOE Advanced Scientific Computing (at LLNL)	—
Chemical/High Explosives Countermeasures (\$65m)	DOE Chemical & Biological National Security (part)	—
University Programs, Emerging Threats, and Rapid Prototyping (\$62m)	—	University Centers Homeland Security Institute
Conventional Missions (\$55m)	—	(~\$35m from HSA RPA for Coast Guard)
Standards (\$25m)	—	—
Transportation Security Admin. R&D (\$75m)	Preexisting program within TSA	—
U.S. Coast Guard RDT&E (\$23m)	Preexisting program within Coast Guard	—

Notes: All transfers were effective March 1, 2003, except Plum Island effective June 1, 2003. Approximately \$100m of other R&D activities exist in other programs outside the Science and Technology Directorate.

Science and Technology Directorate (\$803m)

Hom. Sec. Advanced Research Projects Agency (\$350m)

- the biological component of the Chemical and Biological National Security program, formerly at DOE, transferred to DHS on March 1, 2003;⁶
- activities related to genomic sequencing of microbial pathogens, formerly part of the DOE Life Sciences program, transferred to DHS on March 1, 2003;
- the Plum Island Animal Disease Center, formerly part of the Department of Agriculture, transferred to DHS on June 1, 2003; and
- the National Bio-Weapons Defense Analysis Center, formerly part of the Department of Defense, transferred to DHS on March 1, 2003.

The department's FY2004 budget documents do not make clear whether the Biological Countermeasures portfolio consists entirely of these activities, or whether new activities are also included. In addition, the department has not yet announced publicly whether the existing activities will remain distinct or be consolidated and reorganized. Each activity is discussed in more detail below.

Chemical and Biological National Security. The Chemical and Biological National Security program was formerly part of the Nonproliferation and Verification Research and Development program of the National Nuclear Security Administration (NNSA).⁷ As previously described by NNSA, the program's mission is to develop, demonstrate, and deliver technologies and systems that will improve preparation for and response to chemical or biological attacks. Specific objectives include detection equipment, modeling and simulation of attack effects, and decontamination and restoration techniques. For example, the program provided prototype biological detection equipment for the Salt Lake City Olympics and has installed prototype chemical detection equipment in the Washington Metro subway system.⁸ The FY2003 appropriation for the program was \$68.6 million, down from \$85.2 million in FY2002.⁹

Microbial Pathogens. Activities related to genomic sequencing of microbial pathogens were formerly part of the Life Sciences program of the Office of Biological and Environmental Research in the DOE Office of Science. The largest activity of the Life Sciences program is its role in the Human Genome Project. It also conducts research on molecular and cellular biology, health effects of low-dose

⁶ The schedule of transfers, along with other information, is presented in the Administration's *Department of Homeland Security Reorganization Plan*, November 25, 2002. Online at [www.dhs.gov/interweb/assetlibrary/reorganization_plan.pdf], with budget chart attachment online separately at [www.whitehouse.gov/omb/dhs/MajorComp_Total.pdf].

⁷ NNSA is a semiautonomous DOE agency created in 2000 by the National Nuclear Security Administration Act (Title XXXII of P.L. 106-65).

⁸ Department of Energy, *FY2003 Congressional Budget Justification*.

⁹ Note that the FY2003 funding for this program was provided to the Department of Energy, since the transfer of the program to the Department of Homeland Security took effect nine days after the 2003 Consolidated Appropriations Resolution (P.L. 108-7, H.Rept.108-10) became law. Similarly, the other previously existing programs discussed in this report received their FY2003 funding through the agencies from which they were transferred.

radiation, and other topics. Much of this work is relevant both to microbial pathogens and to other organisms, so identifying which activities to transfer may not have been straightforward. This situation may also create challenges for implementing the transfer without disrupting the research being conducted. The Homeland Security Act required the President to notify the appropriate congressional committees at least 60 days in advance of the transfer of any Life Sciences activities, including the reasoning behind it and a description of its effect on DOE activities. That notification was provided on December 31, 2002.¹⁰ In a hearing prior to passage of the Act, the Director of the Office of Science identified the activities likely to be transferred as the program's work on high-speed DNA sequencing, development of gene sequence comparison technologies, and computational tools for DNA sequence databases.¹¹ FY2003 funding for the transferred activities is \$20 million, representing about 10% of the DOE Life Sciences program.¹²

Plum Island Animal Disease Center.¹³ The Plum Island Animal Disease Center in Greenport, New York, near the tip of Long Island, conducts research and diagnosis on animal disease agents, whether spread intentionally (as in terrorism) or by accident (as in a conventional disease outbreak). During formulation of the Homeland Security Act, two issues were prominent in the debate over whether the Center should be part of the new department. One was the continuing need of the Department of Agriculture for access to such expertise for purposes not related to security. This resulted in a provision in the Act under which the Department of Agriculture will continue to direct and have access to the Center despite its transfer to DHS. Although DHS has assumed administration and management responsibilities for the Center, the Department of Agriculture will continue its R&D and diagnostics programs there, and research staff will remain employees of the Department of Agriculture.¹⁴ The other issue was concern in the local community about security procedures at the Center and the implications of upgrading its laboratories from biosafety level 3 to biosafety level 4. The higher level would require more safety controls but would also permit work on more dangerous diseases, possibly including diseases with no known treatment. The Act requires the President to notify Congress 180 days before any change in the Center's biosafety level. DHS has stated that it "has no plans in the near or long term for a biosafety level 4 facility" at Plum Island.¹⁵ Finally, the Center has been criticized locally for "being opaque about its activities and not communicating well with local government and residents," although its new role in homeland security "seems to have fostered a more favorable

¹⁰ *Notification Regarding the Transfer of Activities to the Department of Homeland Security*, House Document 108-17.

¹¹ Raymond Orbach, Director of the DOE Office of Science, testimony before the House Science Committee, June 27, 2002.

¹² Department of Energy, *FY2004 Congressional Budget Justification*.

¹³ The website of the Plum Island Animal Disease Center is [www.ars.usda.gov/plum].

¹⁴ "Fact Sheet: Plum Island Animal Disease Center Transition," Department of Homeland Security press release, June 6, 2003, online at [www.dhs.gov/dhspublic/display?content=938].

¹⁵ *Ibid.*

attitude toward it.”¹⁶ DHS has stated that it considers public outreach to be “a critical element of its management,” that it will work with the Department of Agriculture to “enhance communications with the community,” and that it intend to create an external advisory committee for the Center.¹⁷ For more information on the relationship between DHS and the Department of Agriculture, see CRS Report RL31466, *Homeland Security Department: U.S. Department of Agriculture Issues*, by Jean M. Rawson.

National Bio-Weapons Defense Analysis Center. The Homeland Security Act transferred the National Bio-Weapons Defense Analysis Center from the Department of Defense to the Department of Homeland Security, but the center was created by the same Act, so in practice it is a new organization.¹⁸ The center’s mission, as stated in the Act, is to develop countermeasures to terrorist attacks with weapons of mass destruction (not necessarily limited to biological weapons, despite the Center’s name). The Administration’s reorganization plan for the Department of Homeland Security indicated a budget for this center of \$420 million in FY2003. The center is not mentioned by name in the Department of Defense Appropriations Act of 2003 (P.L. 107-248) or its accompanying congressional reports, and the Administration has requested a reprogramming of part of the \$420 million into other R&D areas during FY2003, so it is difficult to determine the scope and nature of the center’s activities.¹⁹ The department’s FY2004 budget materials refer to the center as the National Biodefense Analysis and Countermeasures Center and state that it will be located on the interagency biodefense campus at Fort Detrick, Maryland, and managed for DHS by the U.S. Army Medical Research and Materiel Command.

Radiological and Nuclear Countermeasures. The requested FY2004 budget for the Radiological and Nuclear Countermeasures portfolio is \$137 million. This portfolio includes three existing activities that were transferred to the Directorate by the Homeland Security Act:

- activities related to nuclear smuggling, formerly part of the DOE Proliferation Detection program, transferred to the Department of Homeland Security on March 1, 2003;
- the Nuclear Assessment program, formerly at DOE, transferred to the Department of Homeland Security on March 1, 2003; and
- the Environmental Measurements Laboratory, formerly at DOE, transferred to the Department of Homeland Security on March 1, 2003.

¹⁶ Gwendolen Grocock, “Yea & Nay on Plum Forum,” *The Suffolk Times*, July 18, 2002. Online at [www.timesreview.com/st07-18-02/stories/news2.htm].

¹⁷ “Fact Sheet: Plum Island Animal Disease Center Transition,” op. cit.

¹⁸ Homeland Security Act (P.L. 107-296), Secs. 303 and 1708.

¹⁹ For a more detailed account of the Center’s status as of December 2002, see David Clarke, “Ghost Story: How Homeland Acquired a Pentagon Agency that Doesn’t Exist,” *CQ Homeland Security*, December 2, 2002. Online at [homeland.cq.com/hs/display.do?docid=553336].

The proposed FY2004 budget for Radiological and Nuclear Countermeasures includes these activities as well as a number of new initiatives. The department has not yet announced publicly whether the existing activities will remain distinct or be consolidated and reorganized. Each activity is discussed in more detail below.

Nuclear Smuggling. Nuclear smuggling R&D activities were formerly part of the Proliferation Detection program in NNSA's Nonproliferation and Verification Research and Development program. The mission of the Proliferation Detection program, before the transfer, was to develop and demonstrate detection technologies and data analysis techniques that will inhibit nuclear materials diversion, identify and characterize foreign nuclear weapon activities, counter nuclear smuggling, and verify nuclear arms reduction. The program thus included elements related to both homeland security and international nuclear nonproliferation, and in some elements of the program, the overlap between these two aspects may have created difficulties in identifying which program elements to transfer and which to keep at DOE. (In DOE budget documents for FY2003, for example, elements of the Proliferation Detection program were broken down by technology status — enabling technologies, integrated systems, and demonstrations — rather than by objectives such as nuclear smuggling or arms reduction.) The Homeland Security Act provided that the President may designate activities of the Proliferation Detection program either for full transfer or for joint operation by DHS and DOE. Although joint operation could provide some flexibility in addressing the overlap issue, it could also increase management complexity.

Nuclear Assessment. The Nuclear Assessment program was formerly part of Assessment, Detection, and Cooperation within NNSA's International Nuclear Materials Protection and Cooperation activity. The Nuclear Assessment program has three main elements: tracking and assessment of nuclear smuggling events, assessment of communicated nuclear threats, and technical assistance and training support. Its assessments are used by the Department of State, the Federal Bureau of Investigation, the intelligence community, and others.

Environmental Measurements Laboratory.²⁰ The Environmental Measurements Laboratory is a government-owned, government-operated laboratory in New York City with expertise in radiation measurement. It was formerly operated by the Office of Science and Technology of the DOE Office of Environmental Management. The laboratory's annual budget is approximately \$8 million.

Threat and Vulnerability Testing and Assessments. The FY2004 DHS budget request for Threat and Vulnerability Testing and Assessments is \$90 million. The portfolio includes one existing activity that was transferred to the Directorate by the Homeland Security Act:

- computing research conducted at Lawrence Livermore National Laboratory, formerly part of the Advanced Scientific Computing Research program of the DOE Office of Science, transferred to the Department of Homeland Security on March 1, 2003.

²⁰ The website of the Environmental Measurements Laboratory is [www.eml.doe.gov].

The Livermore activities are devoted to research on large-scale computing systems. Their funding for FY2003 is about \$3 million, so they represent only a small portion of the proposed Threat and Vulnerability Testing and Assessments portfolio. Other proposed activities in this portfolio include research and development on the threat of cyberterrorism. At a House Science Committee hearing on May 14, 2003, Under Secretary McQueary stated in response to a question that the FY2004 budget request for the Science and Technology Directorate includes \$7 million for cybersecurity research.

Chemical and High Explosives Countermeasures. The FY2004 budget request for Chemical and High Explosives Countermeasures is \$65 million. The portfolio includes an existing activity that was transferred to the Directorate by the Homeland Security Act:

- the chemical component of the Chemical and Biological National Security program, described above under Biological Countermeasures.

The portfolio also includes work on explosives detection and explosion mitigation that is intended primarily to enhance the work of DHS's Transportation Security Administration (TSA). The department's budget documents do not make clear whether the explosives portion of this program consists of activities formerly conducted by TSA, new activities, or a combination of the two. TSA's own research and development activities are discussed separately below.

University Programs, Emerging Threats, and Rapid Prototyping. The DHS FY2004 budget request for University Programs, Emerging Threats, and Rapid Prototyping is \$62 million. This portfolio will include university centers and the Homeland Security Institute, both mandated by the Homeland Security Act, as well as a program of university fellowships and other activities.

University Centers. The Homeland Security Act provided for the establishment of one or more university-based centers for homeland security R&D. The size and scope of these centers are not yet determined. A separate appropriation is authorized, but university centers could also be funded out of the Acceleration Fund, discussed below. The Act specified 15 areas of expertise that would serve as selection criteria, but it did not explicitly state that these areas should define the scope of the work to be conducted. Some critics claimed that the criteria were fit to a particular university, not to the research needs of the department. Supporters disputed this and asserted that several universities could qualify for a center under the criteria. An agreement that retained the mandate for centers but broadened the wording of the criteria was implemented as Section 101 of Division L of the Consolidated Appropriations Resolution, 2003 (P.L. 108-7). Initial proposals for a few pilot centers are expected to be announced in Summer 2003.²¹

²¹ For more details on the status of DHS plans for university centers, see David Clarke, "Door Creaks Open for Universities Hoping to Host Homeland Research Centers," *CQ* (continued...)

Homeland Security Institute. The Homeland Security Institute will be a federally funded research and development center (FFRDC) that conducts analysis and planning (not laboratory R&D). This concept was initially proposed in a 2002 report by the National Research Council.²² That report described its concept for the Institute as being similar to existing organizations that serve the Department of Defense, such as RAND, MITRE, and the Institute for Defense Analyses. The budget of the Homeland Security Institute is not yet known. A sunset provision in the Homeland Security Act will terminate the Institute on January 24, 2006.²³ Some have expressed concern that this short time horizon may limit the Institute's effectiveness. For more discussion of the Institute and other possible DHS FFRDCs, see CRS Report RS21542, *Department of Homeland Security: Issues Concerning the Establishment of Federally Funded Research and Development Centers (FFRDCs)*, by Michael E. Davey.

Conventional Missions Program. The FY2004 budget request for Conventional Missions is \$55 million. This program will conduct research, development, testing, evaluation, and systems development to support the conventional missions of other units of the department. DHS budget documents do not make clear whether this program is entirely new, or whether it includes activities that were previously conducted by the conventional mission agencies which it now serves.

Standards Program. The FY2004 budget request for Standards is \$25 million. The program's initial focus will be the development of standards for first responder detection equipment and communications protocols. This program appears to be a new activity in FY2004. Standards development is traditionally a function of the National Institute of Standards and Technology, in the Department of Commerce, and the DHS Standards program is expected to work closely with NIST. A memorandum of understanding between NIST and the DHS Directorate of Science and Technology was signed on May 22, 2003.²⁴

Homeland Security Advanced Research Projects Agency. The Homeland Security Advanced Research Projects Agency (HSARPA) is a new organization created by the Homeland Security Act. It is expected to be modeled on the long-standing Defense Advanced Research Projects Agency (DARPA). HSARPA's main responsibility will be to administer the Acceleration Fund for Research and Development of Homeland Security Technologies, whose requested

²¹ (...continued)

Homeland Security, June 4, 2003.

²² National Research Council, *Making the Nation Safer: The Role of Science and Technology in Countering Terrorism* (National Academy Press, Washington, D.C., 2002), p. 344.

²³ Homeland Security Act (P.L. 107-296), Sec. 312(g).

²⁴ "Memorandum of Understanding for Enhanced Coordination in Homeland Security Measurement Science, Standards, and Validation Between the Directorate of Science and Technology, U.S. Department of Homeland Security, and the Technology Administration, National Institute of Standards and Technology, U.S. Department of Commerce," May 22, 2003, online at [www.dhs.gov/interweb/assetlibrary/S_T_MOU.doc].

FY2004 budget is \$350 million, almost half the total requested budget for the Directorate of Science and Technology.²⁵ HSARPA is not a separate program, however, but rather an organization that will manage R&D activities included in the programs discussed above. Moreover, it will not have laboratories of its own or conduct any R&D in-house. The Act directs HSARPA to “administer the Fund to award competitive, merit-reviewed grants, cooperative agreements or contracts to public or private entities, including businesses, federally funded research and development centers, and universities.”²⁶ This mode of operation, funding R&D by others rather than conducting it in-house, is the same as the approach taken by DARPA. In the Administration’s reorganization plan, the Director of HSARPA was to be named as soon as possible after January 24, 2003; no nomination has yet been announced.

Administrative and Advisory Structures. In addition to the above programs, the Directorate of Science and Technology will include several administrative and advisory structures established by the Homeland Security Act. These include the Homeland Security Science and Technology Advisory Committee, the Office of National Laboratories, and a technology information clearinghouse. In the Administration’s reorganization plan, the advisory committee was to be established on June 1, 2003.²⁷

R&D Programs in Other Directorates

Several other organizations in the new department include an R&D component in support of their specific missions. These R&D activities remain with their parent organizations, such as the Transportation Security Administration, and have not become part of the Directorate of Science and Technology. Thus R&D activities are conducted in various parts of the Department of Homeland Security in addition to those described in the preceding section. This section discusses these other R&D programs. All the R&D programs discussed below were transferred to DHS on March 1, 2003.

Transportation Security Administration R&D. The Transportation Security Administration (TSA) was created in November 2001 by the Aviation and Transportation Security Act (P.L. 107-71). The Homeland Security Act transferred it to the DHS Directorate of Border and Transportation Security. TSA took over the security-related R&D programs of the Federal Aviation Administration and has since expanded those activities in both budget and scope. The major thrust of the TSA R&D program up to now has been the development of technologies for detection of explosives in airline passenger baggage. Also included are passenger screening technologies, aircraft hardening, computer modeling of the security system, and other topics. Responses to chemical, biological, and other unconventional threats are a

²⁵ A minimum of 10% of the Fund is to be dedicated to R&D conducted by joint agreement with the Coast Guard. The Coast Guard’s own research and development activities are discussed separately below.

²⁶ Homeland Security Act (P.L. 107-296), Sec. 307(b)(3).

²⁷ *Department of Homeland Security Reorganization Plan*, p. 5.

recent addition to the program. TSA has a laboratory at the Federal Aviation Administration William J. Hughes Technical Center in Atlantic City, New Jersey, but most TSA R&D is conducted extramurally. The FY2004 TSA budget request includes \$75 million for R&D activities. This figure is significantly lower than in FY2003 (\$128 million) or FY2002 (\$164 million). DHS budget documents do not make clear whether the reduction represents a change in priorities, the conclusion of one-time activities associated with the massive deployment of explosives-detection technology in U.S. airports during 2002, or a partial transfer of R&D responsibilities to the Science and Technology Directorate.

Although the Aviation and Transportation Security Act gave TSA the responsibility for ensuring security in all modes of transportation, its main focus so far has been on aviation. Its R&D organization has thus evolved mainly from an organization formerly part of the FAA. Prior to the formation of the TSA, other Department of Transportation organizations also conducted some security-related R&D. For example, the Federal Transit Administration's Office of Technology has conducted R&D on topics such as detection of chemical agents in subway systems. Some of these non-aviation activities may not have completed their moves to TSA prior to its transfer to DHS. If some remain with the Department of Transportation, that would raise issues of coordination between TSA and the Department of Transportation.

Another possible issue for TSA R&D is the status of the TSA laboratory in Atlantic City. Although this facility has its own building, it is located on the campus of the Federal Aviation Administration's Technical Center and has no other DHS facilities nearby. There appear to be no plans to move the laboratory, which could be disruptive to the work being done there. It remains to be seen how this situation will affect efforts to integrate TSA R&D activities into DHS.

Coast Guard R&D. The United States Coast Guard is a distinct entity within the department, not part of any Directorate. The Coast Guard's R&D program, like the Coast Guard as a whole, includes both security-related objectives, such as nonlethal weapons and technologies for contraband detection, and other topics, such as marine safety and navigation aids. The FY2004 Coast Guard budget request includes \$22 million for Research, Development, Testing, and Evaluation. This figure will be significantly augmented by the Homeland Security Act's provision that 10% of the Acceleration Fund (see above in the discussion of HSARPA) shall address Coast Guard needs. In the FY2004 budget request, this additional funding (which would be managed by HSARPA, not the Coast Guard) would be approximately \$35 million.

National Infrastructure Simulation and Analysis Center. The Directorate for Information Analysis and Infrastructure Protection incorporates the former Energy Security and Assurance program of the Department of Energy, whose largest element is the National Infrastructure Simulation and Analysis Center (NISAC). The Energy Security and Assurance program was formerly conducted by the DOE Office of Emergency Operations and builds on activities previously conducted by the Critical Infrastructure Protection program in the DOE Office of Security. NISAC is a joint program of Sandia National Laboratories and Los Alamos National Laboratory. It provides computer modeling, simulation, and analysis of the

nation's infrastructures, with emphasis on interdependencies among infrastructures. The purpose of this effort is to improve mitigation strategies, reconstruction planning, and real-time crisis decision making. NISAC was created by the Critical Infrastructures Protection Act of 2001 (Sec. 1016 of P.L. 107-56, the USA PATRIOT Act) although both Sandia and Los Alamos had capabilities in infrastructure simulation for several years before then.

R&D in Other Transferred Agencies. A number of other agencies that have become part of DHS also conduct R&D. The U.S. Customs Service, which is now part of the Directorate of Border and Transportation Security, conducted approximately \$5 million in R&D in FY2002 and has a central Research Laboratory in Springfield, Virginia.²⁸ The Immigration and Naturalization Service, whose functions have been transferred to the Directorate of Border and Transportation Security and the Bureau of Citizenship and Immigrations Services (which is not part of a Directorate), conducted approximately \$600,000 in R&D in FY2002.²⁹ The Secret Service, now an independent entity within the department, conducted \$1.1 million in R&D in FY2002.³⁰ In general, R&D conducted by these and other transferred agencies is very applied, linked closely with specific agency missions, and relatively modest in scale compared to the other R&D programs discussed in this report.

Related R&D Programs in Other Departments

Despite the creation of the Department of Homeland Security, the establishment of substantial new R&D activities within it, and the incorporation into it of several existing R&D programs from other agencies, the majority of federal R&D related to homeland security remains elsewhere.³¹ Particularly large homeland security-related R&D programs exist in the Department of Health and Human Services and in the Department of Defense. The existence of these substantial programs outside DHS highlights the importance of interagency coordination, which is discussed in the next section. Although the programs of other agencies are outside the main scope of this report, some highlights of HHS and DOD programs are listed below to indicate their scope and nature.

Homeland security-related R&D activities in the Department of Health and Human Services are focused primarily on biodefense and include programs at the following agencies:

²⁸ National Science Foundation, Division of Science Resources Statistics, *Federal Funds for Research and Development: Fiscal Years 2000, 2001, and 2002*, NSF 02-321 (May 2002); The Customs Service Research Laboratory is described at [www.customs.gov/location/labs/labs.htm#RESEARCH].

²⁹ National Science Foundation, *Federal Funds for Research and Development*.

³⁰ National Science Foundation, *Federal Funds for Research and Development*.

³¹ Strictly speaking, some of this work is devoted to counterterrorism rather than homeland security, in that some of it is directed against terrorist threats outside the United States. The technologies developed are often relevant to both goals, however, and this report will use the phrase "homeland security-related" to include both types of R&D without distinction.

- National Institute of Allergy and Infectious Diseases (of the National Institutes of Health, NIH) — Basic and applied research to prevent, diagnose, and treat infectious and immune-related illnesses. The lead federal agency for bioterrorism countermeasures research.
- National Institute of Environmental Health Sciences (of NIH) — Research on the health impact of exposure to environmental agents.
- National Institute of Mental Health (of NIH) — Research on the prevention and treatment of mental illnesses resulting from exposure to mass violence.
- National Institute on Drug Abuse and National Institute on Alcohol Abuse and Alcoholism (both of NIH) — Research on the impact of terrorism on drug and alcohol abuse.
- Centers for Disease Control and Prevention — Bioterrorism preparedness and response activities, including research on vaccines, bioagent diagnostics, and public health surveillance. The lead federal public health agency.
- Food and Drug Administration — Research that supports regulation of the development and licensing of new vaccines, including safety and efficacy studies for investigational drugs that might be used in the event of a bioterrorist attack.
- Agency for Healthcare Research and Quality — Research on strategies for improving the clinical preparedness of health care providers and health care systems to respond to bioterrorism.
- Agency for Toxic Substances and Disease Registry — Research on the public health impact of exposure to toxic chemicals, including information needed in the event of a terrorist attack on a chemical plant.

Homeland security-related R&D activities in the Department of Defense have a strong emphasis on biological and chemical terrorism and include research in the following six categories:

- Contamination avoidance — Research on detectors and monitors, biological long line-source release and point detection, stand-off detection and remote/early warning, nuclear/biological/chemical reconnaissance, warning and reporting, and radiation detection. Also DARPA programs on biosensors, pathogen genome sequencing, and purification/filtration.
- Modeling and simulation — Research on hazards analysis, operational effects analysis, simulation-based acquisition systems, and training simulation systems.
- Individual protection equipment — Research on respiratory equipment, ancillary mask equipment, battlefield protective suits, protective accessories, and specialty suits.
- Collective protection equipment — Research on tentage and shelters, collective protection systems, and generic nuclear/biological/chemical filters and collective protection filtration systems.
- Decontamination equipment — Research on decontamination of personnel, combat equipment, vehicles, and aircraft.

- Joint medical chemical, biological, and radiological defense research
— Research on pretreatment, therapeutics, and diagnostics.

Many of these activities are aimed primarily at military force protection, but many also have civilian applications. For more information on these programs and related issues, see CRS Report RL31615, *Homeland Security: The Department of Defense's Role*, by Steve Bowman.

For an overview of homeland security-related R&D in other federal agencies, see CRS Report RS21270, *Counterterrorism Research and Development: Funding, Priority-setting, and Coordination*, by Genevieve J. Knezo.

Crosscutting Issues

In addition to the program-specific issues identified in the first half of this report, the R&D programs of the new department face a number of questions that cut across program lines. These include the broad question of what models to use for conducting and funding R&D, the impact on existing R&D programs of their transfer into DHS, the challenge of internal R&D coordination and management, the department's relationships with other agencies that also conduct homeland security R&D, its relationship with the national laboratories, its interaction with technology firms in the private sector, and the structure for congressional oversight and funding decisions. These issues are discussed in the remainder of this report.

Models for Conducting and Funding R&D

Although the debate over creating DHS did include various arguments against the inclusion of individual R&D programs, there was little disagreement with the idea that an R&D capability would be needed in some form.³² The question of the form this R&D capability should take, however, remains unsettled, even after passage of the Homeland Security Act. As details were released of the department's FY2004 budget request, some aspects of the proposed R&D agenda became clearer, but major questions remain: How should the department balance different approaches to funding and conducting R&D? To what extent should it use in-house or other federal laboratories; extramural laboratories funded through contracts, grants, or other mechanisms; and intermediate approaches such as existing or newly created Federally Funded Research and Development Centers (FFRDCs)? How should the department balance a focus on bringing technologies to deployment in the near term with the need for basic research that could lead to breakthrough technologies in the long term? What determines whether a particular R&D activity should be conducted in the Directorate of Science and Technology or in an R&D program within another directorate or another agency? How should the department go about prioritizing its R&D needs, and how should that prioritization determine its overall R&D strategy?

³² A report from the Brookings Institution did oppose including R&D functions in the initial creation of the department, but it argued that the role of R&D was not yet sufficiently thought out, not that R&D should be excluded permanently. See Ivo H. Daalder et al., *Assessing the Department of Homeland Security* (Brookings Institution, Washington, D.C., July 2002). Online at [www.brookings.org/dybdocroot/fp/projects/homeland/assessdhs.pdf].

Intramural versus Extramural. The Homeland Security Act provides explicitly for both intramural and extramural R&D activities. Indeed, the existing programs that have become part of the department include government-owned, government-operated laboratories such as the Environmental Measurements Laboratory, a wide portfolio of extramural activities conducted under contract by companies and universities, and intermediate models such as programs at the national laboratories. For new programs, and as the existing programs evolve over time, the department will be faced with choices about which of these models to use in which cases.

Intramural laboratories may have advantages when the research to be conducted is highly specific to the needs of DHS and has little relevance to other applications. In such cases, the relevant expertise may simply not exist elsewhere, or if it does exist, it may be scattered in multiple locations, and there may be advantages in gathering it together in a special-purpose laboratory where a critical mass of experts can be assembled. In the case of particularly sensitive or hazardous fields of research, an intramural laboratory may also have security advantages, although in other departments there are many successful examples of such work being conducted extramurally. On the other hand, research quality could suffer if scientists at intramural laboratories find it more difficult to interact with the rest of the scientific community, if an intramural laboratory finds it more difficult to recruit highly qualified staff, or if an intramural laboratory lacks the resources for state-of-the-art equipment and facilities. Here too, however, there are many examples in other departments of intramural laboratories whose research is first-rate.

There are also indirect consequences of having an intramural R&D capability. In-house technical experts might be more immediately accessible to DHS policy makers who need advice. This could help policy makers keep current on recent advances in technology, understand the significance of advances and recognize how they could be applied, identify areas where more R&D is needed or could contribute to policy goals, and recognize when they need (or could benefit from) additional scientific and technological help. In-house experts might also serve as a link that facilitates access to the rest of the scientific community, and their assistance would presumably make it easier for DHS to judge the quality and relevance of proposed R&D activities, both for the department's own internal planning and when ideas are brought to it by others. On the other hand, there is typically some internal technical expertise in other models too, and there are also clear advantages to obtaining advice from independent, external sources.

Obtaining R&D extramurally may have advantages when the relevant expertise is readily available in universities, industry, or elsewhere. Considerable in-house scientific and technical expertise would still be required to manage extramural programs effectively, but such programs could draw on the entire range of the R&D community, in the United States and perhaps elsewhere. (Even some of the in-house management could be quasi-external. For example, both DARPA and the National Science Foundation make extensive use of outside experts hired as program managers on short-term contracts, and some agencies contract the process of proposal review to private firms or to independent organizations such as the National Academy of Sciences.) New extramural programs could probably be established more quickly than new intramural laboratories and with less administrative overhead.

An extramural model would also limit the risk of creating a federal laboratory that competes inappropriately with existing expertise in the private sector.³³ In the case of HSARPA, which is modeled on DARPA in the Department of Defense, close adherence to that example would result in a program entirely extramural to DHS, although some of the R&D that DARPA contracts out is conducted by other federal organizations, including some intramural government laboratories. (Even when conducted by other federal organizations, work performed under contract to DARPA is funded from DARPA's own budget. A similar arrangement will presumably apply to HSARPA and to DHS generally. Even though the Homeland Security Act gave specific interagency coordination and collaboration responsibilities to the Under Secretary for Science and Technology, coordination may be more effective when accompanied by at least partial budgetary control.) Extramural programs may also be easier to redirect toward new goals when program needs change. On the other hand, the extramural approach gives up the potential intramural advantages noted above, such as the development of a critical mass of researchers in a particular area of need and the possibility of closer security control, and somewhat reduces the opportunity for close contact between policy makers and technical experts.

Intermediate between these options are structures such as federally funded R&D centers (FFRDCs), which are generally created to meet a particular government need not readily met by the private sector, but which are operated by a university, a company, or a nonprofit organization rather than directly by the government.³⁴ The DOE national laboratories, for example, which conduct a significant portion of the S&T Directorate's R&D portfolio, are operated by contractors and are considered FFRDCs. The Homeland Security Act also gives the department explicit authority to establish one or more new FFRDCs.³⁵ This type of approach might make it possible to combine positive features of the intramural and extramural models. For example, security controls and controls on sensitive and proprietary information might be easier to implement than under an extramural contractor, even though the researchers would not be federal employees, yet management might have more flexibility than in an intramural organization, even though it might be more directly controlled by the department than a contractor's management would be.

DHS will probably continue to use a combination of these models for its R&D portfolio. Even among the existing R&D programs that it has absorbed from other agencies, there are examples of all the structures described above. This diversity is not unusual in other departments and may itself have advantages in flexibility .

³³ For examples of this type of concern, see David Clarke, "Private Sector Wary of Competition from Federal Research Centers," *CQ Homeland Security*, January 8, 2003.

³⁴ The National Science Foundation maintains a government-wide master list of FFRDCs online at [www.nsf.gov/sbe/srs/nsf03308/start.htm] (updated January 2003). This list does not yet include any FFRDCs operated on behalf of the Department of Homeland Security. For more information on FFRDCs, see CRS Report RS21542, *Department of Homeland Security: Issues Concerning the Establishment of Federally Funded Research and Development Centers (FFRDCs)*, by Michael E. Davey.

³⁵ Homeland Security Act (P.L. 107-296), Sec. 305.

Basic versus Applied. The responsibilities of the Director of HSARPA include basic and applied research, development, testing and evaluation, accelerated prototyping, and deployment,³⁶ but the Homeland Security Act gives little guidance on the balance among these. As in most other agencies, R&D in the Department of Homeland Security is expected to be driven primarily by the needs of the department's mission, rather than by the inherent interest of the science. DHS has indicated that it intends to focus on relatively near-term, highly applied R&D. Nevertheless, there are cases where quite basic research is clearly mission relevant. This is certainly the case in other agencies. The Department of Defense, for example, spent over \$1.2 billion on basic research in FY2000.³⁷ DARPA, the Defense Department agency on which HSARPA is modeled, spent more than \$52 million, most of it performed at colleges and universities.³⁸ At a later stage of the R&D process, the intermediate steps between research and final product — sometimes known as the “Valley of Death” for technology development — can be particularly challenging.³⁹ DHS may have a role in bridging that gap, much as DARPA sometimes provides development funding if a small company has a unique technology but would have trouble bringing it from the laboratory to the marketplace. It remains to be seen how DHS will seek an effective balance among basic, applied, and intermediate goals.

A related issue is the treatment of basic research with security sensitivity. This issue has arisen repeatedly over the years and has generally been handled by classification, with no limitations placed on unclassified basic research. The Homeland Security Act provides that “to the greatest extent practicable, research conducted or supported by the Department shall be unclassified.”⁴⁰ Treatment of research that is sensitive but unclassified is an issue of current debate. For more information, see CRS Report RL31695, *Balancing Scientific Publication and National Security Concerns: Issues for Congress*, by Dana A. Shea, and CRS Report RL31845, *“Sensitive But Unclassified” and Other Federal Security Controls on Scientific and Technical Information: History and Current Controversy*, by Genevieve J. Knezo.

Centralized versus Decentralized. As noted previously in this report, although the department has a Directorate of Science and Technology, a significant portion of its R&D will be conducted in other directorates. This mixture of centralized and decentralized R&D capabilities is not unusual among federal agencies. In the Department of Energy, for example, the Office of Science accounts

³⁶ Homeland Security Act (P.L. 107-296), Sec. 307(b)(3).

³⁷ National Science Foundation, *Federal Funds for Research and Development*, Appendix Table C-27. NSF defines research as basic if the objective of the sponsoring agency is “to gain more complete knowledge of the fundamental aspects of phenomena and of observable facts, without specific applications toward processes or products in mind.”

³⁸ Ibid.

³⁹ See, for example, Richard W. Marczewski, “Bridging the Virtual Valley of Death for Technology R&D,” *The Scientist*, January 20, 1997. Online at [www.the-scientist.com/yr1997/jan/opin_970120.html].

⁴⁰ Homeland Security Act (P.L. 107-296), Sec. 306(a).

for less than half of R&D expenditures.⁴¹ This approach helps keep R&D programs organizationally close to the ultimate users of their technologies, but it may reduce the opportunity for synergies among programs. In industry, a similar mixture is often found, with a centralized corporate laboratory devoted to R&D of broad relevance and separate division laboratories that focus on the specific needs of individual divisions. The structure of DHS could be interpreted in this way, with the Directorate of Science and Technology providing a centralized “corporate” capability and the R&D functions of the Transportation Security Administration, the Customs Service, and so on providing more specialized “division” capabilities. Some observers, however, might interpret this structure as simply an artifact of the department’s creation from former elements of other agencies. As the department evolves over time, it may have an opportunity to adjust the balance between centralized and decentralized R&D and the allocation of programs to each category.

Impact of Program Transfers

What will be the direct impact on existing R&D programs of transferring them to DHS from other agencies? Possible positive consequences include the potential that closer contact with other homeland security-related activities will result in more effective work and the potential that consolidation in DHS will help prevent duplication of effort, improve the identification of gaps between programs, and ensure that homeland security-related R&D is considered appropriately in budget and policy debates. It is also possible that the transfers will provide an opportunity to take a fresh look at priorities and strategies, making programs more focused and more directly relevant to the department’s mission. On the other hand, there may be some risk of disrupting ongoing R&D efforts that are successful in their current form, particularly in the case of transferred activities that are closely integrated with other activities that will not be transferred. As noted in the first half of this report, this category includes the activities relating to nuclear smuggling and microbial pathogens that were transferred from the Department of Energy. Both of these came from existing programs that were structured in a way that made separation of the transferred parts complex. Awareness of the risk of disrupting these programs is apparent in the special provisions in the Homeland Security Act that give the Administration added discretion in the details of their transfer. Finally, it is possible that duplication could actually be increased at a later time if agencies that have lost a transferred program ultimately conclude that they need to recreate it for their own mission needs. This possibility is more likely in the case of programs that have a strong component not directly related to homeland security, such as work on conventional animal diseases at the Plum Island Animal Disease Center, and here again, as noted in the program-specific section of this report, special provisions in the Homeland Security Act demonstrate congressional awareness of the problem and an attempt to forestall it. In such cases, however, concerns may remain about whether DHS will deemphasize aspects of the transferred programs that are peripheral to its mission but important to other agencies. In all likelihood, the full impact of program transfers will not be apparent for some years.

⁴¹ See CRS Issue Brief IB10117, *Federal Research and Development Funding: FY2004*, coordinated by Michael E. Davey.

Internal Coordination and Management

If it is to capitalize on the potential synergies arising from consolidation, the department will need to ensure that its R&D activities become a coherent interlocking program rather than a collection of disconnected parts. The history of other government reorganizations suggests that this task will be challenging, for components drawn from different sources often tend to stay identifiably separate even after being in the same new department for many years. One aspect of the challenge will be coordinating the R&D activities conducted by different directorates. The Under Secretary for Science and Technology has the responsibility for “coordinating and integrating all research, development, demonstration, testing, and evaluation activities of the Department,”⁴² but this task may be difficult for R&D in the Transportation Security Administration, the Customs Service, and other entities outside the Directorate of Science and Technology, over which the Under Secretary has limited authority.

Managing the transition process itself will be an issue for DHS, in the R&D programs as it is in other parts of the department. The Homeland Security Act became law on December 24, 2002, and most transfers of R&D programs (with some exceptions noted in the first half of this report) took effect on March 1, 2003. Although the Administration had already made substantial efforts at transition planning before final passage of the Act, this was still a rapid schedule. Transition-related issues will likely remain after all the new structures are put in place, both for existing programs that were transferred and for new programs that must be established from the ground up. Maintaining flexibility will help DHS prepare for the likelihood that programs will evolve over time and that unforeseen needs will arise. Indeed, the potential benefits of program transfers will be difficult to achieve if the programs do not evolve as a result of being transferred.

Coordination with Other Agencies

Although DHS will play a central role in the federal government’s R&D efforts relating to homeland security, it will be only one — and not even the largest one — of the federal agencies conducting and funding such work. This situation highlights the importance of interagency coordination. There are several mechanisms in place to address this challenge, including the Office of Science and Technology Policy and Homeland Security Council, both in the Executive Office of the President, and the interagency Technical Support Working Group. For more information on these mechanisms and related issues, see CRS Report RL31576, *Federal Research and Development Organization, Policy, and Funding for Counterterrorism*, by Genevieve J. Knezo. The DHS Under Secretary for Science and Technology also has special coordination responsibilities, and the department in general faces some specific coordination challenges, particularly in its relationships with the Department of Health and Human Services and the DOE system of national laboratories.

Special Coordination Responsibilities of the Under Secretary. Over and above the clear need to ensure interagency coordination, the responsibilities

⁴² Homeland Security Act (P.L. 107-296), Sec. 302.

given to the Under Secretary for Science and Technology by the Homeland Security Act include

developing, in consultation with other appropriate executive agencies, a national policy and strategic plan for, identifying priorities, goals, objectives and policies for, and coordinating the Federal Government's civilian efforts to identify and develop countermeasures to chemical, biological, radiological, nuclear, and other emerging terrorist threats, including the development of comprehensive, research-based definable goals for such efforts and development of annual measurable objectives and specific targets to accomplish and evaluate the goals for such efforts.⁴³

This provision gives the Under Secretary unusual authority over the priorities and policies of other agencies. Because the Under Secretary lacks direct budgetary or management authority over those other agencies, however, it remains to be seen how effectively he will be able to exercise this authority.

The Under Secretary is also responsible for “coordinating with other appropriate executive agencies . . . [to] identify unmet needs.”⁴⁴ In this, he will be assisted by the Homeland Security Science and Technology Advisory Committee, whose only legislatively specified task is to identify research needs.⁴⁵ Other outside bodies may also have useful input into this process. For example, prior to passage of the Homeland Security Act, the National Academy of Sciences issued a report on the role of science and technology in homeland security.⁴⁶ That report included numerous recommendations for research priorities, as well as a short list of seven “urgent research opportunities.”

A particular challenge for coordination will be the fact that many homeland security R&D activities in other agencies have dual application to other goals. For example, many of the DOE researchers with expertise in nuclear incident response are primarily engaged in R&D on nuclear weapons. If agency goals conflict in such cases, that could make effective interagency coordination more difficult. On the other hand, it is also possible that overlapping goals and interests might facilitate interagency relationships if programs are seen as complementary rather than duplicative.

Relationship with the Department of Health and Human Services.

Despite proposals to do so during its formulation, the Homeland Security Act did not transfer the homeland security-related R&D activities of the Department of Health and Human Services into the Department of Homeland Security. Instead, it declared that “the Secretary of Health and Human Services shall set priorities, goals, objectives, and policies and develop a coordinated strategy for such activities in

⁴³ Homeland Security Act (P.L. 107-296), Sec. 302.

⁴⁴ Ibid.

⁴⁵ Ibid., Sec. 311(a).

⁴⁶ National Research Council, *Making the Nation Safer*, op. cit.

collaboration with the Secretary of Homeland Security.”⁴⁷ In addition, it gave the DHS Under Secretary for Science and Technology the responsibility for “collaborating with the Secretary of Health and Human Services and the Attorney General” with regard to the select agent list of bioagents and toxins.⁴⁸ It remains to be seen how this collaboration process will work and how effective it will be, especially in the absence of any direct DHS role in the budget or management of HHS programs. Coordination with HHS is particularly significant because bioterrorism countermeasures makes up almost half the Science and Technology Directorate R&D portfolio, even though HHS remains the largest federal funder of biodefense R&D.

Relationship with the National Laboratories. As already noted, many of the existing R&D programs that were transferred into the department by the Homeland Security Act were previously located in the Department of Energy. Most of these activities are conducted primarily at the DOE national laboratories. These laboratories are owned by DOE but operated by contractors, such as the University of California and Lockheed Martin Corporation, and this status is not changed by the creation of the DHS. (In particular, despite proposals made early in the formulation of the Homeland Security Act, Lawrence Livermore National Laboratory in Livermore, California, was not transferred from DOE to DHS.) In general, national laboratory researchers are employees of the operating contractors, not of DOE. This explains why the number of federal employees involved in these programs often appears disproportionately small relative to their funding levels. In addition, the laboratories have a substantial work-for-others program, under which they already conduct R&D funded by other federal agencies, state agencies, and industry. (DHS programs may be conducted under a direct contract with DHS, however, or through various other arrangements, as well as via the work-for-others program.) Thus the direct effect on researchers of transferring these programs out of DOE may be less than with some of the other programs transferred from other departments.

The Homeland Security Act established an Office of National Laboratories in the Directorate of Science and Technology to coordinate DHS utilization of the national laboratories.⁴⁹ Several of the laboratories have established their own homeland security divisions to facilitate the relationship.⁵⁰ The Homeland Security Act also provided the option of designating a headquarters laboratory for the department.⁵¹ The headquarters laboratory was initially expected to be one of the DOE national laboratories. Livermore was initially the most discussed candidate. At the urging of congressional supporters of other national laboratories (especially Sandia National Laboratories, located primarily in Albuquerque, New Mexico, and Los Alamos National Laboratory, located in Los Alamos, New Mexico) the Homeland Security Act established a procedure for selecting a headquarters

⁴⁷ Homeland Security Act (P.L. 107-296), Sec. 304.

⁴⁸ Homeland Security Act (P.L. 107-296), Sec. 302(9).

⁴⁹ Homeland Security Act (P.L. 107-296), Sec. 309(g).

⁵⁰ See, for example, “Bomb Labs Ready for New Homeland Security Mission,” *CQ Homeland Security*, January 3, 2003.

⁵¹ Homeland Security Act (P.L. 107-296), Sec. 308(c).

laboratory and required a report to Congress 30 days before any selection can be implemented. Subsequent discussions proposed the option of a “virtual laboratory” made up of parts of more than one national laboratory. Many observers now expect that no headquarters laboratory will be designated.

Relationship with the Private Sector

Industry funds and conducts a large majority of U.S. R&D.⁵² The private sector thus represents an important potential reservoir of R&D expertise. In some cases, a private company may be the fastest source for development or acquisition of a new technology. In most cases, a private company will manufacture products that are successfully developed and deployed, wherever the R&D is conducted. The Homeland Security Act specifically provided for HSARPA to operate, in part, through arrangements with “private entities, including businesses.”⁵³ The department’s relationship with the private sector may present some issues similar to those for its intragovernmental relationships with other federal agencies. Other issues may be quite different. For example, some in the private sector have expressed concerns that FFRDCs will “shut them out” of competition for DHS R&D funding.⁵⁴ On the other hand, DHS has apparently been flooded with proposals from companies seeking support for their technologies. On May 6, 2003, the DHS Private Sector Liaison told an industry group that “you are both producer and consumer” of the technologies the Science and Technology Directorate would like to see developed.”⁵⁵ Note, however, that the Private Sector Liaison reports to the Secretary, not the Under Secretary for Science and Technology.

The Under Secretary for Science and Technology has stated that R&D proposals from the private sector should be sent either to the Technology Support Working Group (TSWG) via its website [www.tswg.gov] or to the Directorate of Science and Technology via email to [science.technology@dhs.gov]. Proposals received by either mechanism will be reviewed by TSWG on the Directorate’s behalf, although ultimate responsibility remains with the Directorate. TSWG is an interagency organization, chaired by the Department of State and managed by the Department of Defense, which predates the establishment of the Department of Homeland Security. TSWG’s first Broad Area Announcement for selection of DHS R&D proposals opened on May 14, 2003, and closed on June 13, 2003.⁵⁶

⁵² Industry funded 68.4% of U.S. R&D in 2000 and conducted 74.6%. See National Science Foundation, *Science and Engineering Indicators 2002*, Appendix Tables 4-3 and 4-5, online at [www.nsf.gov/sbe/srs/seind02/].

⁵³ Homeland Security Act (P.L. 107-296), Sec. 307(b)(3).

⁵⁴ See, for example, “Private Sector Wary of Competition from Federal Research Centers,” *CQ Homeland Security*, January 8, 2003.

⁵⁵ “Remarks by Al Martinez-Fonts to the Electronic Industries Alliance,” DHS press release, May 6, 2003. Online at [www.dhs.gov/dhspublic/interapp/speech/speech_0111.xml].

⁵⁶ Details of the Broad Area Announcement are still available from the TSWG BAA Information Delivery System, online at [www.bids.tswg.gov].

Congressional Oversight and Appropriations

A final area of congressional interest for DHS R&D programs is their relationship with the Congress itself. In early 2003, the House and Senate Appropriations Committees were reorganized to create new Homeland Security Subcommittees. On the authorizing side, the Senate Committee on Governmental Affairs and the newly created House Select Committee on Homeland Security are expected to take the lead for at least the duration of the 108th Congress. Several other committees remain interested in DHS R&D programs, however.